CLAIMS

What is claimed is:

1. An Ethernet passive optical network (EPON) ring comprising:

an optical ring with a first end and a second end;

an optical line termination (OLT), which is coupled to the first end and the second end of the optical ring;

a plurality of optical network units (ONU), each of which is connected to the optical ring between the first end and the second end, thus defining a plurality of intersections on the optical ring; and

a plurality of three-port passive optical splitting modules, each of which is installed at one of the intersections and contains three optical ports;

wherein the three optical ports in each three-port passive optical splitting module are connected using three two-way passages to allow the ONU to transmit/receive data via the first end and the second end of the optical ring to/from the OLT.

2. The EPON ring of claim 1, wherein each of the three-port passive optical splitting modules contains three sub-fibers and three optical splitters so that the optical splitters provide the three optical ports and the three sub-fibers couple to the three optical splitters to form the passages.

3. The EPON ring of claim 1, wherein each of the three-port passive optical splitting modules is a plane-wave waveguide.

4. The EPON ring of claim 1, wherein the OLT contains a main server and a backup server connecting to each other, the main server connecting to the first end of the optical

ring and the backup server connecting to the second end of the optical ring.

5. The EPON ring of claim 4, wherein the backup server only backs up data in its normal state and uses the backup data for rescue purposes when the optical network breaks.

6. The EPON ring of claim 5, wherein when there is a breaking point on the optical ring the backup server enables the downstream ONU to transmit/receive data.

7. The EPON ring of claim 1, wherein when there is a breaking point on the optical ring the OLT determines the location of the breaking point according to the data of the ONU received via the first end and the second end.

8. The EPON ring of claim 1 further comprising:

a wavelength division multiplexing (WDM) system, which has a double-port end and a single-port end and couples to the three-port passive optical splitting module via the single-port end;

an optical receiving unit, which connects to the double-port end of the WDM system for receiving signals from the OLT;

a coupler, which connects to the double-port end of the WDM system for receiving signals transmitted by the other ONU;

an optical transmitting unit, which connects to the coupler for transmitting signals to the optical ring; and

a carrier sensor, which connects to the coupler for receiving signals sent by other ONU, thereby controlling the timing for the optical transmitting unit to send signals to the optical ring.

9. The EPON ring of claim 8, wherein the carrier sensor contains a low-pass filter and a threshold sensor so that the low-pass filter checks signals transmitted by other ONU

for the threshold sensor to make decisions.

10. An authorization method for an EPON ring with an optical ring, an OLT connected between the two ends of the optical ring, and a plurality of ONU that use a plurality of three-port passive optical splitting modules to connect to the optical ring, so that each ONU receives/transmits data via the two ends of the optical ring from/to the OLT through the connection of three two-way passages inside the three-port passive optical splitting modules, the method verifying a user who uses an ONU to enter the optical network and comprising the steps of:

receiving a signal sent from the ONU of the user via the two ends of the optical ring;

obtaining the two times of receiving the signal via the two ends;

computing a difference of the two times; and

using the time difference to verify the user's identity.

11. The method of claim 10, wherein the signal is a signal that the user logs into the optical network.

12. The method of claim 10, wherein the step of using the time difference to verify the user's identity comprises the steps of:

using the time difference to find out the location of the ONU of the user on the optical ring; and

using the location of the ONU of the user and the signal to verify the user's identity.

13. The method of claim 10, wherein the user's identity is obtained by comparing the time difference with a user identity table.

14. The method of claim 13, wherein the user identity table is a list of all users and their corresponding time differences.

15. A collision detection method for an EPON ring with an optical ring, an OLT connected between the two ends of the optical ring, and a plurality of ONU that use a plurality of three-port passive optical splitting modules to connect to the optical ring, so that each ONU receives/transmits data via the two ends of the optical ring from/to the OLT through the connection of three two-way passages inside the three-port passive optical splitting modules, the method verifying there is no more than one ONU transmitting data at a time on the optical ring to reduce chances of collisions and comprising the steps of:

receiving a signal transmitted by the optical ring using the three-port passive optical splitting module;

filtering the signal;

verifying that the signal is transmitted by other ONU; and

forbidding the ONU from transmitting the signal.

16. The method of claim 15, wherein the signal is a signal that other ONU has a login activity.

17. The method of claim 15, wherein the step of filtering the signal is followed by the step of using a threshold to determine the signal.

18. The method of claim 17, wherein the threshold uses the wavelength of the signal for determination.

19. The method of claim 15, wherein the ONU is controlled to send the signal if no other ONU is transmitting any signal in the step of verifying that the signal is transmitted by other ONU.